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(54) Flow control mechanism

(57) A flow control mechanism has two support members 5, 18 provided with respective ceramic discs 2, 3 arranged in face to face relationship in a body 8. One of the support members 18 is fixed relative to the body 8 and the other support member 5 has a sleeve 9 extending from the body 8 on which a control member 11 is mounted for rotating the support member 5 relative to the body 8 to vary the overlap of openings in the discs 2, 3 to control fluid flow. The fluid flows out of the mechanism through the sleeve.

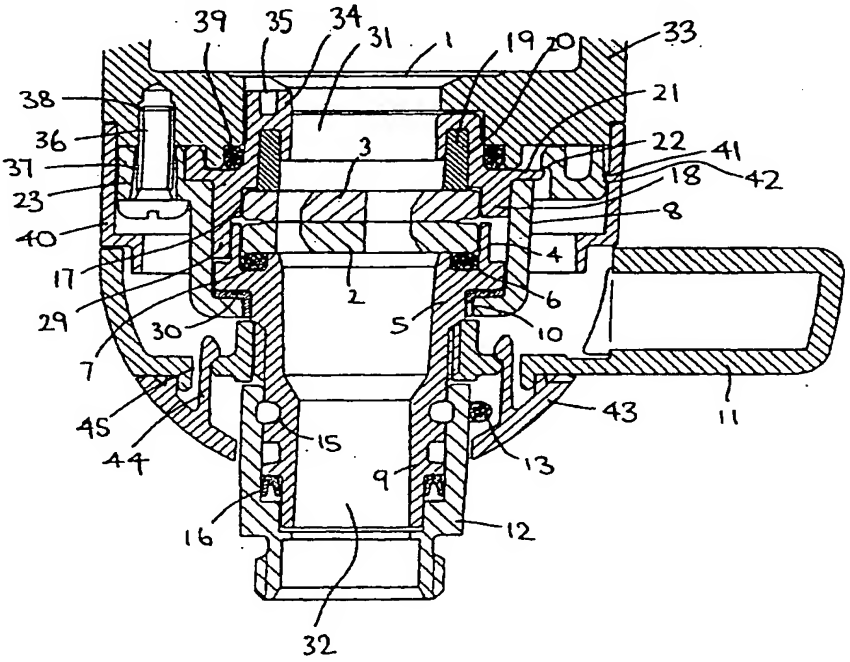

FIGURE 1.

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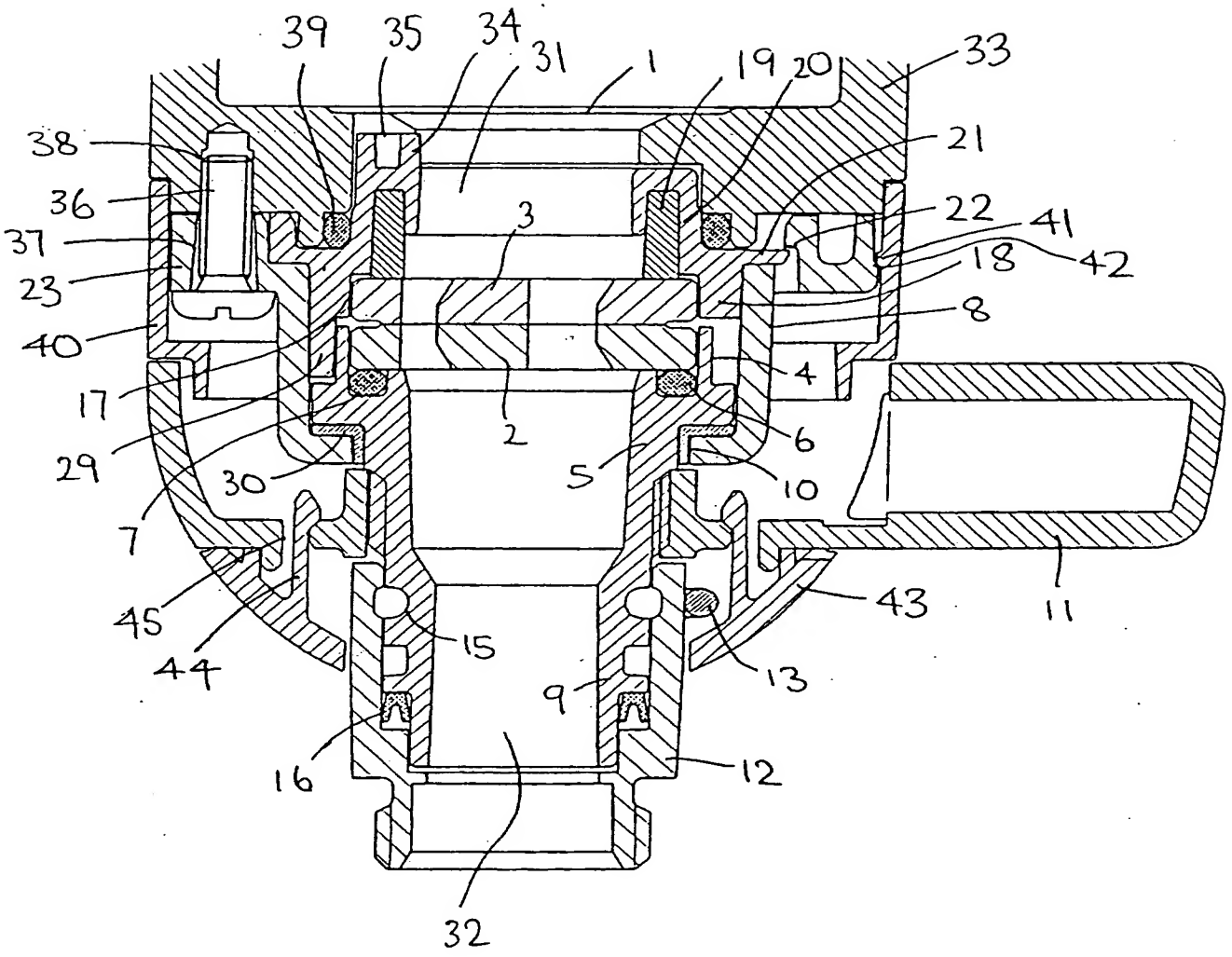

FIGURE 1.

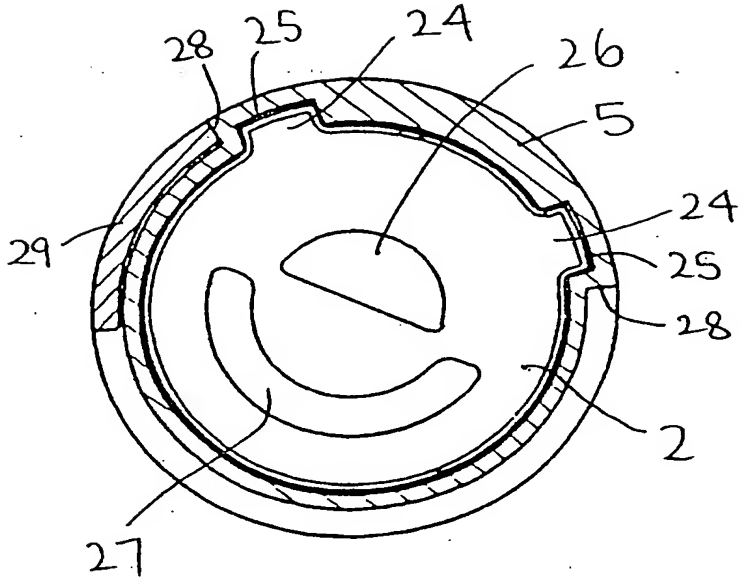

FIGURE 2.

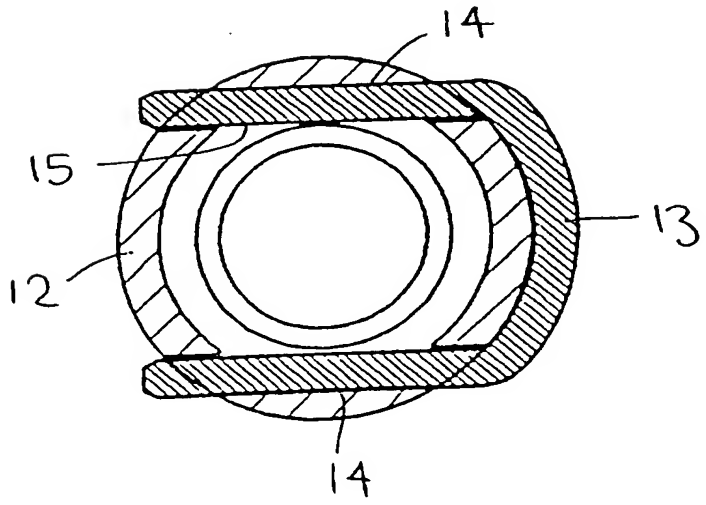

FIGURE 3.

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FLOW CONTROL MECHANISM

This invention relates to a mechanism for controlling fluid flow and in particular, though not exclusively, for controlling the flow of water in ablutionary installations.

Mixing valves for ablutionary shower installations are known having separate user operable controls for adjustable selection of water temperature and flow. In such valves, the water temperature is typically thermostatically controlled so as to maintain the selected water temperature constant and separate adjustment of the flow enables the user to vary the spray force for a given water temperature.

It is an object of the present invention to provide a flow control mechanism of simple, reliable construction suitable for mixing valves used in a wide range of applications having different requirements for installation and/or use including healthcare, education, military and leisure complexes.

According to the present invention we provide a flow control mechanism having a body in which two control elements are mounted in face to face relationship, each control element being provided with at least one through opening, the control elements being relatively rotatable to overlap at least partially the openings so that fluid can flow from an inlet through the openings to an outlet, and a support member for one of the control elements mounted for rotation in the body and having a sleeve extending from the body through which fluid can flow, the sleeve being adapted for rotating the support member to adjust the overlap of the openings for controlling fluid flow.

Other features, benefits and advantages of the invention will be understood from the following description of an exemplary embodiment with reference to the accompanying drawings wherein:-

FIGURE 1 shows a flow control mechanism according to the invention in longitudinal section mounted on a mixer valve;

FIGURE 2 is a transverse section of the rotatable disc and support member; and

FIGURE 3 is a transverse section of the locking pin and outlet connector.

The flow control mechanism is shown mounted in an outlet 1 of a mixer valve for hot and cold water and comprises two relatively rotatable control elements in the form of discs 2,3 mounted in face to face relationship for controlling the flow rate of blended hot and cold water

supplied to an ablutionary appliance (not shown). The discs 2,3 are made of ceramic material but other materials may be used.

The disc 2 is located in an annular seating 4 of a support member 5 made of plastics and is sealed on the face remote from the disc 3 by a rubber sealing ring 6 of circular section that is received in an annular groove 7 formed in the seating 4.

The support member 5 is mounted for rotation in an outer body 8 made of plastics or metal such as brass and has an axial sleeve 9 extending through a central aperture 10 at one end of the body 8 on which a manually operable control lever 11 and an outlet connector 12 are mounted.

The control lever 11 and sleeve 9 have co-operating axial serrations to secure the control lever 11 against rotation relative to the sleeve 9 and the outlet connector 12 is releasably secured to the sleeve 9 by a detachable locking pin 13 of U-shape to axially locate and retain the control lever 11.

The outlet connector 12 is provided with two cross-drillings 14 to receive the legs of the locking pin 13 which engage a circumferential external groove 15 in the sleeve 9 so that the support member 5 is free to rotate independently of the outlet connector 12 and the locking pin 13 is held firmly to withstand high tensile loads which may be applied in use.

A lip seal 16 is provided between the sleeve 9 and outlet connector 12 to prevent leakage and offers minimum friction for relative rotation of the sleeve 9 and outlet connector 12.

The disc 3 is located in an annular seating 17 of a support member 18 made of plastics and is sealed on the face remote from the disc 2 by a silicone rubber sealing bush 19 of rectangular section that is received in an annular groove 20 formed in the seating 17.

The support member 18 is provided with circumferentially spaced radial ears 21 arranged to snap engage corresponding undercuts 22 in a mounting flange 23 at the end of the body 8 remote from the support member 5 to secure the support member 18 against rotation and to retain the support member 5 with controlled pre-loading of the discs 2,3 being provided by compression of the sealing bush 19 to make a seal between the facing surfaces of the discs 2,3.

The discs 2,3 are identical and are provided with two circumferentially spaced radial lugs 24 arranged to engage corresponding radial recesses 25 in the associated support member 5,18 to secure each disc 2,3 against

supplied to an ablutionary appliance (not shown). The discs 2,3 are made of ceramic material but other materials may be used.

The disc 2 is located in an annular seating 4 of a support member 5 made of plastics and is sealed on the face remote from the disc 3 by a rubber sealing ring 6 of circular section that is received in an annular groove 7 formed in the seating 4.

The support member 5 is mounted for rotation in an outer body 8 made of plastics or metal such as brass and has an axial sleeve 9 extending through a central aperture 10 at one end of the body 8 on which a manually operable control lever 11 and an outlet connector 12 are mounted.

The control lever 11 and sleeve 9 have co-operating axial serrations to secure the control lever 11 against rotation relative to the sleeve 9 and the outlet connector 12 is releasably secured to the sleeve 9 by a detachable locking pin 13 of U-shape to axially locate and retain the control lever 11.

The outlet connector 12 is provided with two cross-drillings 14 to receive the legs of the locking pin 13 which engage a circumferential external groove 15 in the sleeve 9 so that the support member 5 is free to rotate independently of the outlet connector 12 and the locking pin 13 is held firmly to withstand high tensile loads which may be applied in use.

A lip seal 16 is provided between the sleeve 9 and outlet connector 12 to prevent leakage and offers minimum friction for relative rotation of the sleeve 9 and outlet connector 12.

The disc 3 is located in an annular seating 17 of a support member 18 made of plastics and is sealed on the face remote from the disc 2 by a silicone rubber sealing bush 19 of rectangular section that is received in an annular groove 20 formed in the seating 17.

The support member 18 is provided with circumferentially spaced radial ears 21 arranged to snap engage corresponding undercuts 22 in a mounting flange 23 at the end of the body 8 remote from the support member 5 to secure the support member 18 against rotation and to retain the support member 5 with controlled pre-loading of the discs 2,3 being provided by compression of the sealing bush 19 to make a seal between the facing surfaces of the discs 2,3.

The discs 2,3 are identical and are provided with two circumferentially spaced radial lugs 24 arranged to engage corresponding radial recesses 25 in the associated support member 5,18 to secure each disc 2,3 against

section between the support member 18 and the valve body 33 to seal the connection between the inlet 31 and the outlet 1.

The screws 36 are concealed by a skirt member 40 made of plastics which is attached to the mounting flange 23 by an internal rib 41 arranged to snap over an external shoulder 42 on the flange 23.

The locking pin 13 is concealed by a cap member 43 made of plastics which is releasably secured to the control lever 11 by resilient legs 44 arranged to snap into holes 45 in the control lever 11.

The outlet connector 12 could be rigidly clamped to a pipe or connected to a flexible hose for supplying temperature controlled blended water to a fixed shower head or handset (not shown). Alternatively, the outlet connector 12 could be provided with a swivelling outlet spout (not shown) for supplying temperature controlled blended water to a bath or washbasin.

It will be understood from the foregoing description of an exemplary embodiment that the flow control mechanism is of simple construction for assembly using snap or push fits thereby reducing the number of components required. In addition, the control elements are pre-loaded by the snap-fit of the fixed support member preventing penetration of dirt or debris between the co-operating faces of the control elements during shipment and installation of the flow control mechanism thereby ensuring reliable operation.

In the embodiment above-described, each control element has two through openings and the control elements are relatively rotatable over 180° to control flow. It will be understood this is not essential and that the number size, shape and arrangement of the through openings may be chosen to provide any desired flow control for relative rotation of less than 360°. For example, the desired flow control may be obtained by relative rotation over 90° with at least one through opening in each control element.

Other alternatives or variations will be apparent to those skilled in the art and are deemed within the scope of the invention.

Claims:

1. A flow control mechanism having a body in which two control elements are mounted in face to face relationship, each control element being provided with at least one through opening, the control elements being relatively rotatable to overlap at least partially the openings so that fluid can flow from an inlet through the openings to an outlet, and a support member for one of the control elements mounted for rotation in the body and having a sleeve extending from the body through which fluid can flow, the sleeve being adapted for rotating the support member to adjust the overlap of the openings for controlling fluid flow.

2. A flow control mechanism according to Claim 1 wherein a support member for the other control element is fixed relative to the body.

3. A flow control mechanism according to Claim 2 wherein the fixed support member and the body are arranged to be snapped together to secure the fixed support member to the body.

4. A flow control mechanism according to Claim 2 or Claim 3 wherein the rotatable support member is axially located and retained by the fixed support member.

5. A flow control mechanism according to any one of Claims 2 to 4 wherein the fixed and rotatable support members are co-operable to limit relative rotation of the control elements.

6. A flow control mechanism according to any one of Claims 2 to 5 wherein each control element is located against rotation relative to the associated support member.

7. A flow control mechanism according to Claim 6 wherein each control element is mounted in an annular seating of the associated support member.

8. A flow control mechanism according to Claim 6 or Claim 7 wherein each control element is sealed relative to the associated support member on that face remote from the other control element.

9. A flow control mechanism according to Claim 8 wherein one of the control elements is sealed relative to the associated support member so as to axially pre-load the control elements when the fixed support member is secured to the body.

10. A flow control mechanism according to any one of the preceding Claims wherein each control element is in the form of a disc.

11. A flow control mechanism according to Claim 10 wherein each disc is made of ceramic material.

12. A flow control mechanism according to any one of the preceding Claims wherein an actuator member is mounted on the sleeve for rotating the rotatable support member.

13. A flow control mechanism according to Claim 12 wherein the actuator member comprises a lever.

14. A flow control mechanism according to Claim 12 or Claim 13 wherein the actuator member is retained by an end fitting rotatable relative to the sleeve.

15. A flow control mechanism according to any one of the preceding Claims wherein the sleeve provides an outlet at one end of the body and the other end of the body has an inlet.

16. A flow control mechanism according to Claim 15 wherein the inlet is adapted for connection to an outlet of a mixer valve for hot and cold water.

17. A flow control mechanism according to Claim 16 wherein the inlet is adapted for locating the body in one orientation relative to the mixer valve.

18. A flow control mechanism comprises two support members provided with respective control elements arranged in face to face relationship in a body, one of the support members is fixed relative to the body, and the other support member has a sleeve that extends from the body and is adapted for rotating the support member relative to the body to vary the overlap of openings in the control elements for adjusting fluid flow.

19. A flow control mechanism substantially as hereinbefore described with reference to the accompanying drawings.

20. A mixer valve having an outlet communicating with the flow control mechanism according to any one of the preceding Claims.